A PROGRAM TO INVESTIGATE, CHARACTERIZE AND DESCRIBE METEORITES IN THE COLLECTIONS OF ARIZONA STATE UNIVERSITY

Semiannual Status Report

for the Period March 1, 1973 to August 31, 1973

Grant NGL-03-001-001

From

National Aeronautics and Space Administration

To

Arizona State University

Center for Meteorite Studies

By

Carleton B. Moore, Principal Investigator

October 1, 1973

INTRODUCTION

This is a status report of the research and operational activities carried out during the ninth six-month period of Grant NGL-03-001-001 from the National Aeronautics and Space Administration to the Arizona State University Center for Meteorite Studies. During this period, work was continued on the chemical analysis of iron meteorites, chondrites, achondrites, and lunar samples. A program of collecting bibliographic information on meteorites and classifying it by individual meteorite was continued.

During the period covered by this report, 51 specimens were transferred for purposes of scientific research to 15 investigators. One hundred and sixteen specimens were loaned to 11 investigators for non-destructive investigations. Sixty seven new meteorites were added to the collection.

The research staff supported by the grant during this period was:

Charles F. Lewis, B.S., Associate Curator; March 1, 1973 to August 31, 1973

The salary of the principal investigator is paid entirely by Arizona State University.

METEORITE CHARACTERIZATION

The analysis of alkali metals in selected chondrites is completed and being prepared for publication.

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The analyses of iron meteorites is being continued. Special elements being studied in addition to those included in previous studies include zinc, manganese, and chromium.

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An investigation of metallic particles in ejecta from Barringer Meteorite Crater was initiated and preliminary results accepted for publication in Geochemica et Cosmochemica Acta.

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An examination of sulfide minerals in LL chondrites has been completed.

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Over 100 suspected meteorites were sent to us for examination. Two proved to be of meteoritic origin.

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The Principal Investigator for this grant has acted as a Principal Investigator and a member of the Preliminary Examination Team for the returned lunar samples, utilizing techniques developed for meteorite analysis.

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Several new chondritic meteorites were described.

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Studies of organic compounds in carbonaceous chondrites were continued in collaboration with investigators at the NASA Ames Research Center. Low molecular weight carboxylic acids were isolated and characterized.

PUBLICATIONS

Publications prepared, printed or presented during the period March 1, 1973 to August 31, 1973, completely or partially supported by NASA Grant NGL-03-001-001 include:

85. D.E. Lange and J.W. Larimer, "Chondrules: An Origin by Impacts Between Dust Grains," Science. In press.

86. W.R. Kelly and C.B. Moore, "Iron Spectral Interference in the Determination of Zinc by Atomic Absorption Spectrometry," Anal. Chem. 45, pp. 1274-1275, 1973.

87. David E. Lange and C.B. Moore, "The Willowbar Meteorite" Meteoritics 8, #3, pp. 263-275, 1973

Other publications related to lunar samples were:

C.B. Moore, C.F. Lewis, J. Cripe, F.M. Delles, and W.R. Kelly and E.K. Gibson, "Total Carbon, Nitrogen, and Sulfur in Apollo 14 Lunar Samples", Geochim. Cosmochim. Acta 2, pp. 2051-2058, 1972.

Abstracted papers presented at meetings of professional societies during 1973 included:

"Total Carbon Contents of Apollo 16 Lunar Samples," C.B. Moore and C.F. Lewis: Fourth Lunar Science Conference, Houston, Texas, March 5-8, 1973.

"Some Boron Geochemistry in Arizona," Carleton B. Moore and Kent K. Knock: Arizona Academy of Science, Tucson, May, 1973.

"A Technique for Determining Chemically Combined Nitrogen in Geologic Samples," Jerry D. Cripe and Carleton B. Moore: Arizona Academy of Science, Tucson, May, 1973.

"Boron in the Geochemical Cycle," Carleton B. Moore and Kent K. Knock: American Chemical Society, San Diego, California, November, 1973.

FUTURE PLANS

Work will continue on the analysis of meteorites and the statistical evaluation of this data. New meteorites will be tested, characterized and described. Without the support provided by NASA for Mr. Lewis' curatorial activities, the efficiency and usefulness of the Center's program would be slowed appreciably.

TRANSFERRED

D. Bogard NASA Johnson Space Center	1.2 grams 1.0 1.1	Oberlin Ramsdorf Rose City
D.S. Burnett California Institute of Technology	0.9 2.5	Mokoia Murray
P.R. Buseck A.S.U.	0.8 2.2 1.2 0.9 1.0 0.1 0.1	Barratta Bjurbole Bruderheim New Concord Farmington Shallowater Bishopville
S. Epstein California Institute of Technology	331.4 158.3 310.5 321.0 2.0 2.2 2.4	Allende Allende Allende Allende Coolidge Murchison Murray
E.K. Gibson NASA Johnson Space Center	1.0	Murray
P.S. Goel Indian Institute of Technology Kanpur, India	19.0 6.0 0.6 1.5 7.9 5.0 1.2 0.6 0.9 5.7 0.6 1.5 8.3 0.6 2.0	Albin Altonah Bald Mountain Beardsley Canyon Diablo (1949) Carbo Coolidge Florence Murray Ogallala Pasamonte Richardton Santa Apolonia Sioux County Tenham
R. Henritze Univ. of Wyoming	234.2	Albin

M. Herndon N.O.A.A. Earth Science Lab. Boulder, Colorado	0.1 grams	Mokoia
R.E. Jones U.C.L.A.	2.5	Dispatch
G. Kullerud Purdue University	0.2	La Fayette
M.Z. Lowenstein Adams State College Alamosa, Colorado	324.0 266.7	Allende Plainview
C.B. Moore A.S.U.	36.7 4.0 17.0 5.3	Kelly Mount Morris Murchison Murchison
O. Müller Max-Planck-Institut fur Kernphysik Heidelberg, Germany	0.3 0.3 0.3	Allende Murchison Murray
H. Nagasawa Gakushiun University Tokyo, Japan	138.0	Allende
D.F. Nava NASA Goddard Space Flight Center	1.2	Norcateur

LOAN

T. Bunch NASA Ames Research Center	2.2 grams Polished Section	Nogoya Bondoc
P.R. Buseck A.S.U.	Polished Section	Imilac Brenhom Albin Mt. Vernon Santa Rosalia Springwater Ahumada Mt. Vernon Antofagasta Marjalahti
I.R. Cameron Univ. of New Brunswick	243.7 grams 247.6 290.4 195.3 281.4 316.7 310.9 314.2 247.8	Alamogordo Aurora Forest City Gilgoin Station Indianola Loomis Neenach Otis Richardton
R. Gooley NASA Johnson Space Center	Polished Section " " " " " " " " 1.0 1.2 1.1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	Spearmon Odessa Ainsworth Huizopa Hualapai Moore County Moore County Irtuk Pasamonte Pasamonte Haraiga Nobleborough Petersburg Abee Abee Allegan Allegan Bruderheim Bruderheim Bursa Bursa Dhurmsala Dhurmsala

R. Gooley (cont.)	0.2 grams	Ergheo
	0.2	Ergheo
	0.2	Farmington
	0.2	Farmington
	0.2	Forest City
	0.2	Forest City
	0.2	Kesen
	0.2	Kesen
	0.2	Marion (Iowa)
	0.2	Marion (Iowa)
	0.2	Modoc (1905)
	0.2	Modoc (1905)
	0.2	Richardton
	0.2	Richardton
	0.8	Beardsley
	0.8	Bjurbole
	0.7	Elenovka
	1.0	Kunashak
	0.8	New Concord
	1.0	Leedey
	0.7	Nulles
	1.5	Saratov
	0.2	Archie
	0.2	Atarra
	0.2	Ausson
	0.2	Aztec
	0.4	Bath
	0.1	Canakkale
	0.3	Canellas
	0.3	Castalia
	0.3	Charsonville
	0.6	Colby (Wisconsin)
	0.4	Florence
	0.4	Forksville
	0.2	Girgenti
	0.2	Kandahar
	0.4	Kuttippuram
	0.2	Kyushu
	0.2	Limerick
	0.3	Merua
	0.4	Monroe
	0.2	Ochansk
	0.2	Pantar
	0.3	Queen's Mercy
	0.3	Rangala
	0.4	St. Michel
	0.4	Searsmont
	0.6	Sena
	0.2	Shelburne
	0.3	Weston
	0.3	Woolgorong
	0.3	Zavid

R.E. Jones U.C.L.A.	1412.2 grams 207.0	Cedar (Kansas) Dispatch
E.A. King Univ. of Houston	3.0 3.4 11.1 1.2 7.2 4.1 2.3 2.2 1.7 5.8 3.9 4.1	Brownfield (1937) Bruderheim Faith Forest City Holbrook Lake Labyrinth Leedey Leoville Murchison Peetz Seminole Tenham
D.F. Nava NASA Goddard Space Flight Center	135.4 102.1	Shallowater Wickenburg
R.S. Rajan Univ. of California Berkeley	0.7	Mokoia
W.F. Read Lawrence Univ.	504.1	Ness County (1938)
H. Schwarcz McMaster Univ.	10.0	Odessa
A. Varn So. Florida & Bishop Planetarium Bradenton, Florida	102.0	Plainview

EXCHANGE

L.H. Ahrens Univ. of Cape Town Rondebosch, C.P. South Africa	6.0 grams 10.0 6.0	Enon Mincy Patwar
American Museum of Natural History	22.5	Nulles
	56.2	Bushnell
	63.9	Channing
	40.0	Cottonwood
	132.1	Farley
	50.0	Ferguson Switch
	45.8	Garnett
	260.0	Holyoke
	54.7	Romero
	295.7	Weldona
	129.0	Adrian
	26.6	Monze
	20.9	Saratov
	15.6	Bursa
	58.3	Dwight
	34.9	Erie
	90.4	Hardwick
	43.7	Grady (c)
	66.8	Norcateur
	24.0	Otis
	86.5	Lincoln County
	64.5	Peetz
	92.4	Springfield
	31.6	Budulan
	21.0	Clover Springs
	15.6	Enon
	37.7	Dora
	72.1	Newport
	39.3	Coya Norte
	137.1	Mount Joy
	65.8	Chihuahua City
	45.8	Quartz Mountain
	3091.0	Santiago Papasquiaro
	115.0	Willow Creek
	112.4	Weaver Mountains
	53.0	Wiley
R.B. Berg Montana Bureau of Mines & Geology Butte, Montana	273.9	Allende
E.L. Krinov Academy of Science of the USSR Moscow, USSR	92.0	Monahans

H. Nagasawa Gakushiun University Tokyo, Japan	33.0 grams	Coolidge
C. Pearson	284.0	Odessa
Western Australion Museum	1226.5	Plainview
C. Rhoton, Jr.	25.0	Albin
Keyes, Oklahoma	330.5	Allende
	311.8	Canyon Diablo
	97.0	Plainview
	380.0	Willowbar
John T. Wasson U.C.L.A.	8.3	Quartz Mountain
W. Zeitschel	17.4	Rifle
Hanau, Germany	19.5	Santiago Papasquiaro
	32.9	Willow Creek

SPECIMENS RECEIVED

Meteorite	Weight	Source
Arltunga	24.3 grams	South Australian Museum (exchange)
Felt	115.2	American Meteorite
Shields	179.4	Laboratory (purchased)
Kumerina	238.6	Western Australian
Warburton Range	185.7	Museum (exchange)
Canyon Diablo	13,746.8	(purchased)
Canyon Diablo	608.0	Dr. A. Adel, NAU
	344.0	Flagstaff, Arizona (Gift)
Weston	135.6	
	126.6	
St. Louis	0.7	W.S. Houston (Gift)
Sequin	42.5	
Mount Padbury	21.7	American Museum of
Prarie Dog Creek	77.0	Natural History
Kaldoonera Hill	39.8	(exchange)
Cobija	17.2	
Canton	67.9	
Colfax	38.4	
Bischtube	71.8	
Coolac	26.1	
Okono	18.7	
Bridgewater	36.4	
Juncal	21.0	
Pricetown	1.1	
Putinga	12.3	
Grosnaja	5.5	
Ubereba	9.6	
Rich Mountain	4.0	
La Becasse	1.5	
Lixna	4.0	
Serra de Mage	2.0	
Vishnupur	10.0	
Valley Wells	16.2	
El Perdido	30.1	
Dandapur	21.5	
Tadjera	18.7	
Laborel	16.9	

Meteorite	Weight	Source
Willowdale	14.2 grams	American Museum of
Lowicz	20.2	Natural History
Kulnine	37.4	(exchange)
Lancon	11.0	
Yandama	18.2	
Lesves	12.2	
Alleppo	13.4	
Buschhof	14.0	
Blithfield	14.5	
Efremovka	27.2	
Forest Vale	19.0	
Simondium	14.8	
Rowena	9.6	
Miller (Kansas)	6.0	
Maziba	6.6	
Malotas	4.7	
Moti-ka-nagla	7.7	
Aguada	12.0	
Aumale	5.2	
Cocklebiddy	8.2	
Cashion	6.4	
Dimboola	7.2	
Lundsgard	14.4	
Plantersville	8.0	
Veramin	8.4	
Vulcan	8.8	
Kediri	2887.0	(purchased)
Puerto Libertad	66.0	(purchased)
Willowbar	1816.0	(exchange)
Uegit	58.5	University of Rome, Italy (exchange)

SUMMARY

51 specimens were transferred to 15 investigators for scientific research

116 specimens were loaned to 11 investigators

56 specimens were exchanged with 9 institutions or individuals

67 specimens were added to the Collection by purchase or exchange
62 of these were falls not previously in the Collections

Over 100 suspected meteorites were sent in for examination--two of which were of meteoritic origin

∿ 100 "Meteor wrongs" were checked: One (Puerto Libertad) from Mexico was indeed a stonly (L) meteorite